# DEQ Environmental Excellence Conference
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## *How One Virginia Locality is Integrating Harvested Rainwater into its Operations*

Dan Frisbee
Water Resources Specialist
City of Charlottesville

«Мир — это зеркало, которое показывает каждому человеку его собст

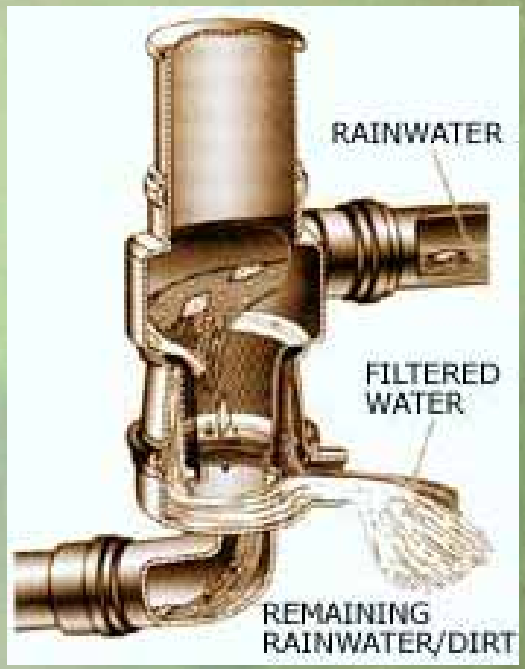
# What is Rainwater Harvesting?

*Source: IntraDayFun*

- Collection and conveyance of rainwater for storage and use
- Non-potable uses include:
  - Irrigation
  - Toilet flushing
  - Laundry
  - Vehicle and facility cleaning
  - Fire suppression systems
  - HVAC cooling towers
  - Agriculture
- Potable uses include (with proper treatment):
  - Drinking water
  - Showers / baths
  - Dishwashing
  - Swimming pools

# A Basic Rainwater Harvesting System

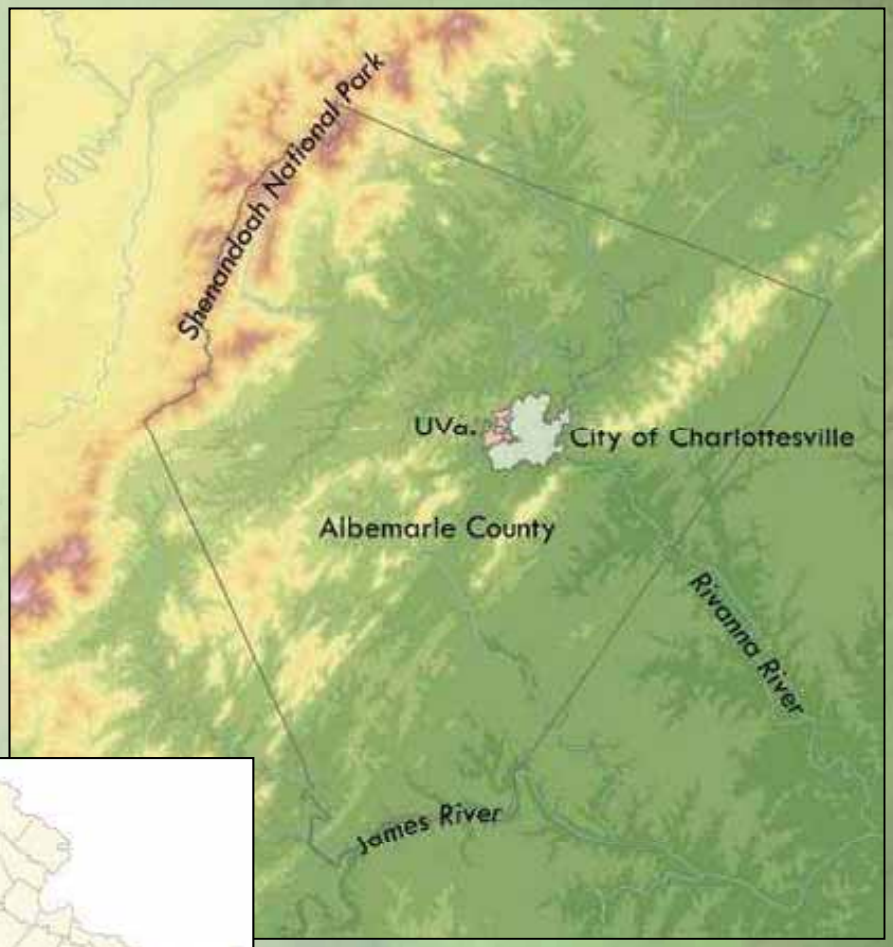
1. Catchment – surface to collect rain
2. Conveyance – transport water from catchment to storage facility
3. Catchment “washing” – first flush diverter to remove debris / solids and contaminants
4. Storage – cistern or tanks where water is stored until used
5. Purification – range of options dependent upon end use of water
6. Distribution – system that delivers the rainwater




*Source: WISY*

# Charlottesville: The City

- Independent City - 1888
- 10.4 Square Miles
- Home to the UVA
- ~43,500 Residents




*Source: University of Virginia*

*Source: StreamWatch*

# City Council Vision 2025: A Green City

Charlottesville citizens live in a community with a vibrant urban forest, tree-lined streets, and lush green neighborhoods. We have an extensive natural trail system, along with **healthy rivers and streams**.

We have **clean** air and **water**, we **emphasize recycling and reuse**, and **we minimize stormwater runoff**.

Our homes and buildings are sustainably designed and energy efficient.

# Why Rainwater Harvesting?

*source: Mr. Ole Ersson*

- Potable Water Conservation
- Stormwater Management
- Water Resources Protection
- Sustainability / Green City Goals

# Charlottesville Municipal RWH Projects

- 10 projects on (or in) the ground
- Wide variety of system complexity, equipment, and end uses of rainwater; retrofits as well as new and redevelopment scenarios
- **> 124,000** gallons of storage capacity
- > **81,000** square feet of roof surface captured
- 1” of rain  from captured area = > **45,600 gallons**
- Annually (@ 44”/year) = > **2 million gallons**

# Toe in the Water: the Urban Farm

- 6,500 gallons of storage for irrigation of urban gardens serving low income residents

- Partnered w/ local non-profit & LA firm, property managers

# City Public Works Yard

- 3,000 gallon cistern with vortex filter for use in the City's DPW street sweepers
- Gutter reconfiguration, 50 GPM pump, and specific hose coupling for efficient sweeper filling

# School Yard Gardens

- Edible teaching gardens at City elementary and middle schools

- Educational signage developed with students and school staff

# Charlottesville High School

- 26,000 square feet of the Performing Arts Center roof captured – all came through one existing manhole – rerouted through vortex filter and into 40,000 gallon underground storage system

- Rain Tank system wrapped in geo-textile liner and impervious membrane

- Maintenance ports, overflow to existing stormwater system, pump system to an existing irrigation system for adjacent ball field

Charlottesville High School
Stormwater Retrofits
Legend
Biofilter
Biofilter Drainage Area
Rainwater Harvesting Tanks
Rainwater Harvesting Drainage Area
Rainwater Harvesting Vortex Filter
Stormwater Structure
Stormwater Pipe
Stream
Feet
0
75
150
225
300
N

CAT

DEERE
50D

DEERE
50D

HydroPro
ITT

# Charlottesville Area Transit

- New complex for CAT administration, operations, and maintenance – office space, maintenance garage, bus wash, fueling station
- 50,000 gallon underground system collects rainwater from ~20,000 square feet of rooftops from two buildings
- System can supply ~500,000 gallons of water per year

# Charlottesville Area Transit

Most complex treatment of any City RWH project: vortex filters, charcoal filter, and ultraviolet light

# Charlottesville Area Transit

Water used primarily for bus washing, but also for toilet flushing and exterior hose bibs

# Fontaine Fire Station

- Brand new state of the art fire station
- Used to help satisfy stormwater requirements
- 20,000 gal underground system will collect rainwater from ~13,000 square feet of rooftop
- Water to be used for washing of fire department apparatus, toilet flushing, and exterior hose bibs
- System can supply ~300,000 gallons per year

# Bringing it Home

- Rainwater is a resource to be utilized, not a waste product to be sent down the (storm) drain
- Rainwater harvesting is a multi-tasker
- This is not new… people have been harvesting rainwater for hundreds of years and now its time has come

- RWH is one important way in which the City is striving to achieve sustainability and become a Green City

# Resources

- Virginia Rainwater Harvesting Manual (Cabell Brand Center – 2009 Second Edition) http://www.cabellbrandcenter.org/Downloads/RWH_Manual2009.pdf

- Virginia DEQ Stormwater Design Specification No. 6: Rainwater Harvesting http://vwrrc.vt.edu/swc/documents/2013/DEQ%20BMP%20Spec%20No%206_RAINWATER%20HARVESTING_Final%20Draft_v1-9-5_03012011.pdf

A GREEN CITY

# THANK YOU

Dan Frisbee
Water Resources Specialist
City of Charlottesville
frisbee@charlottesville.org